

tion of this species in the collection, the only definite locality recorded being May's Landing, N. J. It should occur commonly in the pine-barren regions of the state.

NEW YORK BOTANICAL GARDEN

## REVIEWS

### *Greene's Landmarks of Botanical History\**

Julius von Sachs' well-known history of botany from the sixteenth century to the year 1860 is confessedly brief in its treatment of the beginnings of botanical science. Furthermore, it was written as a volume of a series on the history of the sciences in Germany and is somewhat predominantly German in its outlook, even though it must be admitted that the modern developments of the science of botany have, in a large measure, been fostered on German soil. And, again, this work, like its recent continuation by Professor J. Reynolds Green (1909), was written by a botanist who was primarily a physiologist, and the physiological aspects of the science are the ones that receive the most adequate treatment. The historical works of Sprengel (1807-'08) and of Meyer (1854-'57) do more justice to the very interesting beginnings of botanical literature, but they were never translated and are less well known to English and American readers.

This first instalment of Doctor Edward Lee Greene's "Landmarks," covering the period prior to the year 1562, will therefore prove most welcome to the many botanists, both amateur and professional, who have been awaiting a readable scholarly account of the earlier phases of the development of their science. A reader equipped with a certain amount of knowledge of the morphology of plants and with a certain degree of personal familiarity with plants in the field and garden is likely to find Dr. Greene's elegantly phrased paragraphs so interesting and illuminating that the book, once opened, will hardly find its way to the shelves until it has been read through.

\*Greene, Edward Lee. *Landmarks of Botanical History. A Study of Certain Epochs in the Development of the Science of Botany. Part I—Prior to 1562 A. D.* Smithsonian Miscellaneous Collections, part of volume 54. Pp. 1-329. 1909.

The present part of the "Landmarks", after the preface and the introductory remarks on the "Philosophy of Botanical History", includes nine chapters, with headings as follows: I. The Rhizotomi; II. Theophrastus of Eresus, B. C. 370-286 (or 262); III. Greeks and Romans after Theophrastus; IV. Introductory to the Sixteenth-Century German Fathers; V. Otho Brunfelsius, 1464-1534; VI. Leonhardus Fuchsius, 1501-1566; VII. Hieronymus Tragus, 1498-1554; VIII. Euricius Cordus, 1486-1535; IX. Valerius Cordus, 1515-1544.

In the introductory chapter on the "Philosophy of Botanical History", the author discusses in a very entertaining manner the development of human ideas in regard to the plant world and the early attempts to arrange these ideas in an orderly fashion. "Botany", he says, "did not begin with the first books of botany, nor with the men who indited them; though every historian of the science whom I have read has assumed that it did. The most remote and primitive of botanical writers, of whatever country or language, found a more or less extensive vocabulary of elementary botany in the colloquial speech of all". He then goes on to show the baselessness of "the fond conceit" "that there was never anything in the world that could be called science until some three centuries ago, or four, at the farthest."

Among the ancient Greeks were the rhizotomi, "mostly illiterate men and quacks" whose root-gathering for medicinal purposes was often accompanied by prayers, incantations, and other curious ritual, but some of them studied the nature and properties of plants in a scientific way and wrote books, which were quoted by Aristotle and Theophrastus. One of these, Cleidemus, is said to have "investigated diseases of plants, especially of the fig-tree, olive-tree, and vine." Professor Greene pronounces him "the earliest of vegetable pathologists". Another of these protobotanical Greeks, whose writings are known to us only from excerpts made by their more illustrious countrymen, was Hippon, concerning whom the author of the "Landmarks" has the following paragraph:

"Hippon was among the rhizotomi who philosophized about plants in general, and wrote books. His writings are quoted by

both Aristotle and Theophrastus, and he appears to have been the earliest among students of plant life and form to venture the opinion that all cultivated trees, shrubs, and herbs have been derived from wild ones, and are susceptible of reversion to their pristine condition. It is the earliest hint—and a very early one, apparently unknown to the annalists of evolution—of what cultivation may accomplish in the way of transformation. But the doctrine must have had the sound of a heresy verging toward atheism in the ears of a populace that had never questioned the proposition that every cultivated plant and tree had been coeval with the human race, and had been so created at the first.”

But the longest, by far, of the chapters of the present part of the “Landmarks” is that devoted to Theophrastus of Eresus, whom Linnaeus called the Father of Botany, though in later years that title has sometimes, by the less discriminating, been transferred to Linnaeus himself. Several pages are given to what is known of the personal history of Theophrastus, including many interesting details of his relations with Aristotle, his teacher, patron, and devoted companion. A personal sketch of this sort, by the way, accompanies the discussion of the work of each of the early botanists considered in the succeeding chapters, a feature that for many readers will doubtless contribute much to the interest and attractiveness of the book. The botanical work of Theophrastus is treated under the general headings, “Method”, “Vegetative Organography”, “Anthology”, “Fruit and Seed”, “Anatomy”, “Phytography”, “Taxonomy”, “Ecology”, “Dendrology”, and “Transmutation”, followed by a “Recapitulation”. In his studies of flowers Theophrastus recognized the centripetal and centrifugal types of inflorescence, the hypogynous, perigynous, and epigynous modes of insertion of the corolla and androecium, and the fact that the “head” in the composites is a flower-cluster and not a single flower. In regard to the inflorescence of composites Professor Greene remarks: “Less than three generations ago, eminent systematists were still writing up the scales of such involucre as ‘sepals’, the whole involucre as a ‘calyx’, and the circle ray flowers as the ‘corolla’.” At this juncture the sublime old Greek will appear to have lived before his time by more than two thousand years.” In connection with the

observations of Theophrastus on germinating seeds, the author of the "Landmarks" has the following:

"To the beautiful work of a Malpighi one gives somewhat more credit than is fairly due it, until one has read these chapters of the ancient Athenian master. Then it is clearly apprehended that the man of the seventeenth century may have received the suggestions of his own work directly from the Greek philosopher; and is almost ready to add that the beautiful drawings of sprouting grain adorning Malpighi's folio might almost have been done from the Theophrastan descriptions of the same. It must needs be conceded that the botanic garden at Athens, founded by Aristotle, and the earliest of which there is any record, was wonderfully prolific of new botanical facts of profoundest import."

Theophrastus appears to have had little sympathy with popular notions of his day as to the possible changing of plants into others of different kinds. In regard to one phase of this belief he observes: "Some say that barley changes to wheat sometimes and wheat to barley, and that in the same field. Such statements are to be received as fables. Changes of that kind would be without a cause. It is diversity of condition that induces change."

Under the heading "Taxonomy", Dr. Greene discusses in a very interesting and instructive manner the ideas of Theophrastus in regard to genera and various other aspects of the interrelationships of plants. The author candidly admits that "one ascertains with difficulty, if at all, what the historian is most in need of knowing, namely where this writer of the first book of botany is recording points of taxonomy that are of prehistoric discovery and universal traditional acceptance, and where he is introducing some amendment or improvement of his own." These words were written especially of some of the primary groupings of plants made by the Greek philosopher, but Dr. Greene, we think, would be the first to acknowledge and does acknowledge, by implication, at least, that the same difficulty obtains in connection with the generic names adopted by Theophrastus—a reflection that might well give pause to any one who, in quest of primal historic truth and absolute justice in matters of botanical nomenclature, would be so bold as to cite Theophrastus as the author of any particular generic name.

The influence of Theophrastus in fixing the names of plants is well summed up in the following passage:

“Pliny, the supreme Latin writer about plants, in translating Theophrastan texts by the hundred into Latin for Roman readers, made use of familiar Latin names in place of the Greek names when there were such, *e. g.*, instead of the Greek itea he wrote salix; in place of drys, quercus; Latin ulmus, sambucus, and ranunculus in place of Theophrastan ptelea, acte, and batrachium. There were still many scores of plant types which were known to Latins by no other names than those that had been assigned them in Greek; another evidence that Theophrastus by his books had been the one teacher and authority upon botany to Latins as well as Greeks. Platanus, cerasus, rhamnus, anemone, thalictum, delphinium, helleborus, paeonia, and a host of other such remained the only names of the genera, whether one spoke or wrote in Latin or in Greek; and so during some seventeen centuries most of the plant names in use were quoted from Theophrastus. The popular fable about Linnaeus as first nomenclator of botany is not yet a hundred years old, and will need to be perpetuated for sixteen centuries yet to come if the years of his nomenclatorial fame are to equal those during which Theophrastus held the prestige.”

As a particular instance of the Theophrastan conception of genera Dr. Greene cites the four species of water-lilies for which recent writers use the names *Nymphaea lutea*, *Castalia alba*, *Castalia Lotus*, and *Nelumbo speciosa*—species which Linnaeus grouped in the single genus *Nymphaea*, although Theophrastus had them under the four names Nymphaia, Sida, Lotos, and Cyamos, respectively. Referring to the generic relationships of these four plants, Dr. Greene remarks, . . . “recent systematists have well-nigh completely returned to the Theophrastan view, in all save the names of genera; and the restoration of even these will follow under the law of priority.” It will hardly be denied, we think, that, although the botanists of the present generation may profit by some instruction as to the merits of Theophrastus, very few of them will feel any necessity, either moral or practical, for adopting the botanical language of the Greeks to any greater extent than they have already adopted it through inheritance. And, in the opinion of the reviewer, the prevailing sentiment of the botanists of the present day in this particular is likely to be

strengthened rather than weakened as the time-distance from Theophrastus increases. Nevertheless, it must be admitted that Dr. Greene's sympathetic and masterly interpretation of the writings of Theophrastus has brought the "Father of Botany" appreciably nearer to the botanists of the present age.

Among the botanical writers discussed in the chapter on "Greeks and Romans after Theophrastus", the principal are Nicander of Colophon, Cato, Varro, Virgil, Columella, Dioscorides, Pliny, and Galen. "The scientific botanist among the Greeks", Dr. Greene observes, "was Theophrastus; and there is no comparison between him and Dioscorides, whose theme was medical botany; but, quite as usual, the man of 'applied science' was the one to meet with general appreciation and approval. . . . Latin editions of Dioscorides are too numerous to be given a reckoning; and almost the same may be said as to early translations of him into modern tongues; for between the years 1555 and 1752 there were at least twelve Spanish editions, as great a number in Italian". And there were several editions, also, in French and German. Nicander, a Greek grammarian and poet, wrote, it seems, a versified dissertation on poisonous fungi and another on the cultivation of edible mushrooms. The Roman writers treated of plants chiefly in their relations to horticulture and agriculture. "Cato (B. C. 235-149) knew 125 kinds of plants, Varro (B. C. 117-27) mentions 107, Virgil (B. C. 70-19) 164. Yet the sum total of the plants of these Romans, 245, is only about half the number that had been known by Theophrastus some 300 years earlier."

The sixteenth-century "German Fathers" whose lives and works are interestingly set forth by Dr. Greene are Brunfels, Fuchs, Tragus, Euricius Cordus, and Valerius Cordus. The author of the "Landmarks" is so bold as to say that the works of the "German Fathers" have been quite inadequately examined even by the German historians. "Julius von Sachs, the latest in the line, copied Sprengel's caption 'The German Fathers', etc., but knew next to nothing of their works, even rating as unimportant Valerius Cordus, who was immeasurably the greatest of them all."

Brunfels and Fuchs were concerned almost wholly with medical botany. They both illustrated their principal works copiously with the idea of improving upon certain other plant illustrations then in vogue and with the intention of facilitating the identification of plants used in medicine. Their descriptions were copied or compiled from Theophrastus, Dioscorides, Pliny, Galen, and other ancient writers, with occasional annotations and discussions of their own. The works of Brunfels and of Fuchs enjoyed great popularity, but Dr. Greene considers it "superlative" to include these two worthies among the "German Fathers of Botany", though some such title as "Fathers of Plant Iconography" might fittingly be bestowed upon them. But the works of Tragus and of Valerius Cordus were of another character, and these two authors may justly be called the "Fathers of Descriptive Botany". "Both these were deeply interested in plants of all kinds; were given to examining their organs minutely and marking the behavior of certain growths at different stages, and all this before even having thought of writing books thereon. . . . They were under an inspiration of a new idea in botany, namely, that plants might be so described as to be identified by description."

Valerius Cordus is chiefly interesting "as having been the father and educator of that most brilliant of early German botanists, Valerius Cordus." However, he wrote a booklet, the "Botanologicon", in which he exposed the folly and danger of trying to make the descriptions of Grecian medicinal plants always fit the plants that are native in Germany. Valerius Cordus, who died of a fever in Rome at the early age of 29 years, has been characterized by the historian Meyer as "a splendid and all too transitory phenomenon." The chief work of Valerius Cordus, entitled "Historia Plantarum", was not published until seventeen years after his death. The young Cordus described living plants in a very accurate, systematic, and independent fashion. In connection with his work Dr. Greene remarks:

"Cesalpino, of the end of the sixteenth century, will be praised in future milleniums for having founded Systematic Botany. But had Valerius Cordus lived to only twice his nine-and-twenty years, it is easy to conceive that the great Italian might have

missed his laurels. Among the nature students of four hundred years ago I know not who else is so far from accepting things on other people's guess or hearsay as Valerius Cordus; in whom I have not yet read a line that savors of the fabulous or superstitious; and that, for the period, is much to say of any author."

In face of the erroneous and more or less superstitious notions as to the reproduction of ferns that were then current even among the best-educated, Cordus boldly ventures the following in regard to the trichomanes fern:

"It grows copiously on moist shaded rocks, although it produces no stem, or flower or seed. But it reproduces itself by means of the dust that is developed on the back of the leaves, as do all kinds of ferns; and let this statement of the fact once for all suffice."

And the following paragraph from Dr. Greene's work, relating to one of the observations made by this clear-seeing and clear-thinking German youth, who died as long ago as 1544, will be of historical interest to many economic botanists of the present day:

"The plant physiologist of to-day, interested in the functions of the root tubercles of leguminous plants may find in Valerius Cordus the earliest mention of these organs. I do not find him taking note of them except as occurring in the cultivated lupine of Europe. Accustomed to give a full account of every kind of root, even to its medicinal usefulness or uselessness, he says of that of the lupine that it is 'slender, woody, white and without useful properties, parted into a few slender fibers upon which there sometimes grow small tubercles.'"

Part I. of Dr. Greene's "Landmarks" covers a most interesting and hitherto inadequately treated period in the history of botany. The work will be needed by all libraries that contain Julius von Sachs' well-known history and by all botanists who feel an interest in the recorded beginnings of their science.

MARSHALL A. HOWE

#### FIELD MEETINGS FOR 1910

In the *American Naturalist* for January, 1899, Dr. Arthur Hollick has pointed out the great influence of the geological formation on the forest conditions of New Jersey. All the territory